4.0 SCENARIO GENERATOR

In the context of community planning, the term "scenario" is often used interchangeably with the term "vision." A vision, however, typically provides only general direction, usually articulating values and goals of the community for its future. In the CCIAM, scenarios may be interpreted as the land use result of alternative policies. Each scenario involves a particular combination of variables – although the simulation can be replicated any number of times using different combinations of variables.

Users can describe and input alternative scenarios according to the location, type, extent, and configuration of "additional development activities." The model uses "land use change" as the "currency" for scenarios, instead of "additional development", in order to accommodate scenarios that consider reversion of developed areas to undeveloped conditions. The model utilizes modifications to the Wastewater Planning Units (CH2M HILL 2000) as the analysis unit, and, therefore, as the means to determine the location of development. The type, extent, and configuration of land use change may vary within and among analysis units. For example, two different units may experience different types of development, or different areas within a unit may experience different configurations.

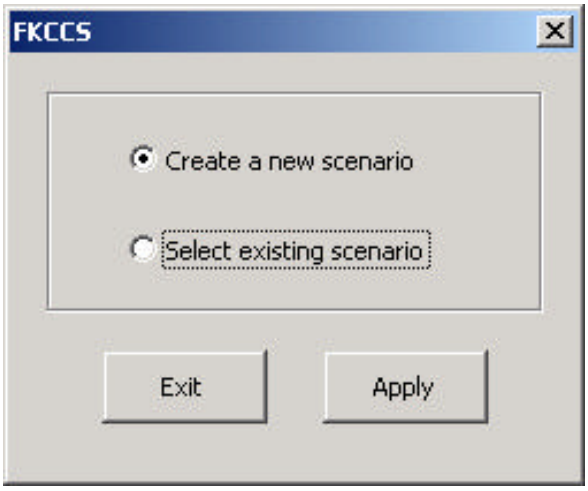
The user may choose among three types of development: new development, which results in vacant land being developed; re-development, which changes the character of developed parcels; and restoration, which reverts developed lands to a natural state. Within each type, development may be residential, commercial, industrial, or recreation, among others. The user may also specify the intensity or magnitude of development defined as area or number of units. For example, residential development may be low density or high density. Finally, the distribution of the development defines the spatial configuration of the user-defined scenario.

4.1 Graphical User Interface

The GUI consists of several computer screens which allow users to select among menu options and, in some cases, to input specific values such as number of dwelling units, percent of parcels, or acreage affected. The following list describes the primary screens:

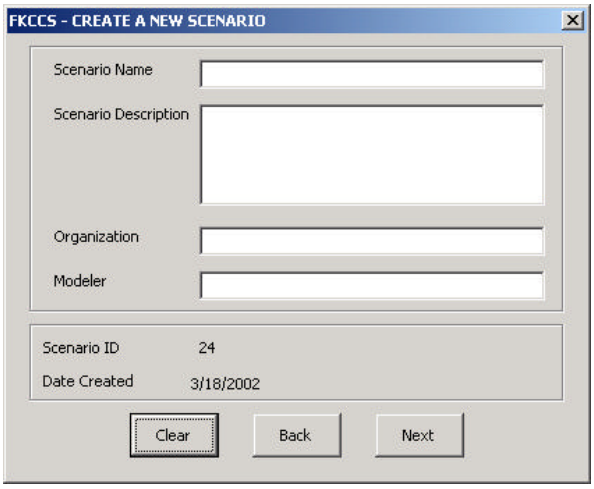
CCIAM Entrance. Allows the user to select for a new scenario or an existing saved scenario (Figure 4.1).

FIGURE 4.1
SCENARIO SELECTION



Create a New Scenario. Allows the user to name and describe the scenario and add the name of the user and organization (Figure 4.2).

FIGURE 4.2
NEW SCENARIO DESCRIPTION



Land Use "Change From" Conditions. Allows the user to select the type of land use to be modified. Secondary menus allow for selecting a specific set of conditions defining the parcels to be affected. Users may select for parcels that meet all specified criteria (e.g., scarified parcels within 100 feet of U.S. 1) or that meet any of the criteria (e.g., scarified or within 100 feet of U.S. 1; Figure 4.3).

FIGURE 4.3 a
VACANT LAND CHANGE FROM GUI SCREENS

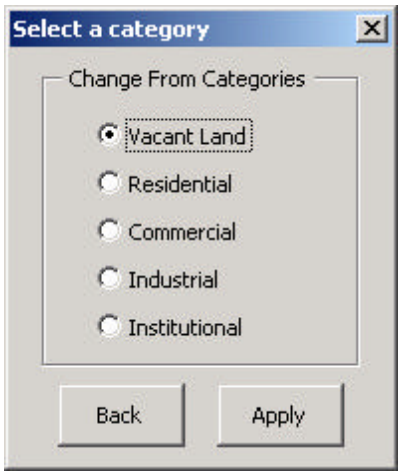
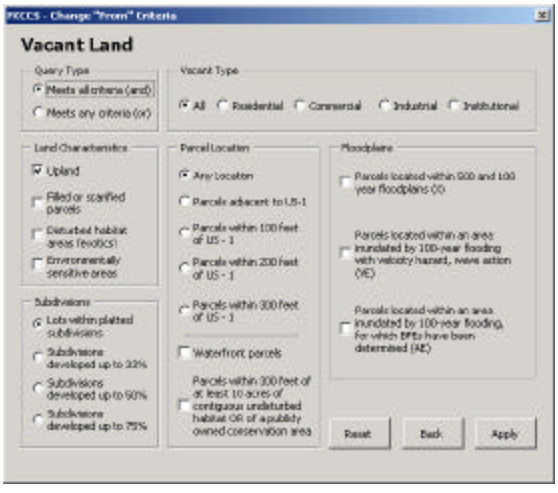


FIGURE 4.3 b
VACANT LAND CHANGE FROM GUI SCREENS



Land Use "Change To" Conditions. Allows the user to define the future land use for the selected areas. This also leads to secondary screens where the user can specify type of activity, density of development, magnitude of change, and percent of parcels affected (Figures 4.4a and 4.4b).

FIGURE 4.4 a
RESIDENTIAL CHANGE TO GUI SCREENS

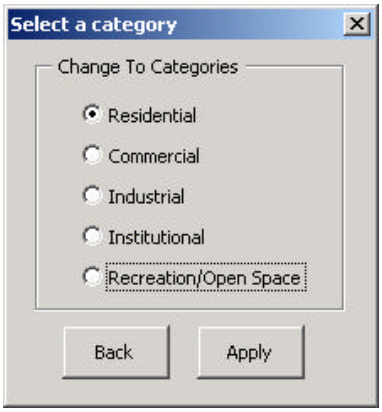
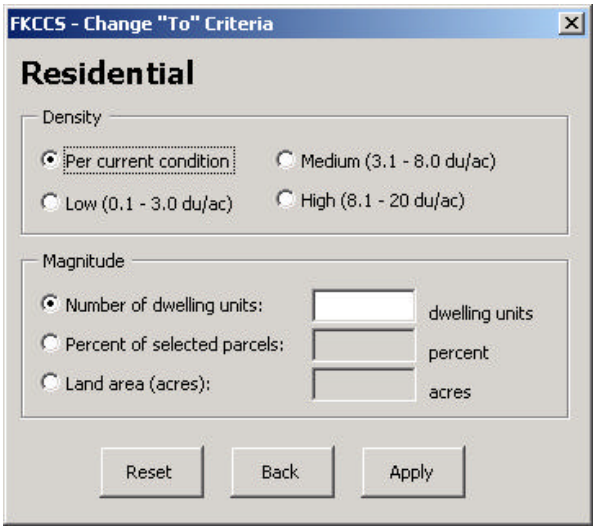
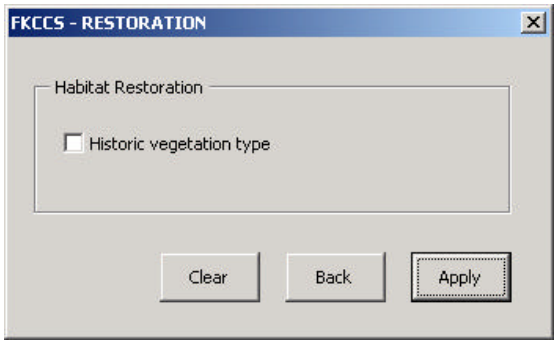


FIGURE 4.4 b
RESIDENTIAL CHANGE TO GUI SCREENS



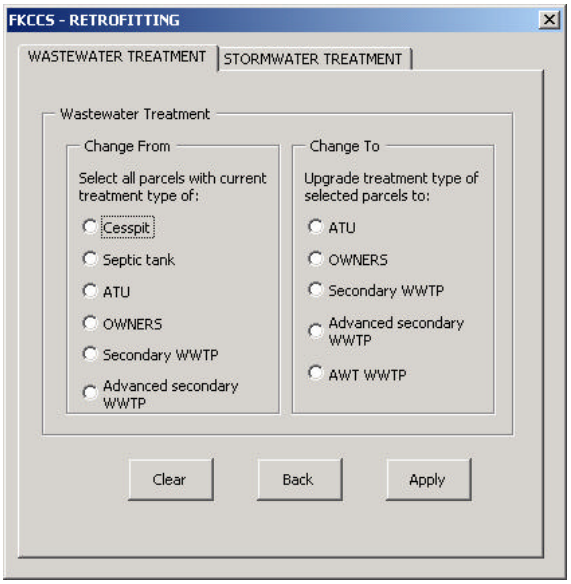
Restoration. Allows user to define scenario as a return from the current condition to the historic vegetation cover type (Figure 4.5; see Section 9 for a discussion of historical vegetation in the Florida Keys).

FIGURE 4.5
RESTORATION GUI SCREEN



Retrofitting. User-defined options for wastewater and stormwater treatment. This applies the treatment to parcels in which the land use is not changed (Figure 4.6).

FIGURE 4.6
RETROFITTING GUI SCREEN



Other screens provide options for selecting BMPs for stormwater treatment. Once the user has navigated the CCIAM interface and input criteria for the selected scenario, the scenario is saved and the model is ready to run.

4.2 Basis for Land Use Change in the Scenario Generator

The scenario choices determine a new spatial pattern of land use, which triggers each of the modules' impact evaluation. Therefore, land use change is the primary basis of the CCIAM. The GUI includes options to allow users to choose a subset of lands for development. For those cases, the model was programmed to "select" specific areas based on a predetermined "suitability" ranking that reflects common planning standards and regulations in Monroe County. The suitability analysis represents a "pre-processing" activity in the CCIAM (i.e., the analysis was done manually to prepare the data for use in the scenario definition). The following steps were followed to complete the land use and suitability analysis:

Determine the Availability, Suitability, and Development Capacity of Vacant Land

"Vacant lands" were identified in the parcel GIS layer. In conventional land use analysis, the "Vacant Land" category may provide an adequate measure of future development capacity. However, in the Florida Keys this approach would ignore the existence of stringent regulatory constraints (e.g., zoning, development standards, and environmental protection measures) and socioeconomic aspects (e.g., ownership pattern, location preferences, and cost-related factors such as pre-existing infrastructure), which influence the probability that vacant land will be developed. Therefore, the availability, development suitability, and development capacity of vacant land was evaluated.

The objectives of this vacant lands evaluation were:

- To generate an effective vacant land inventory by excluding unavailable vacant land from the total vacant land inventory. Criteria included ownership (private vs. public), use (conservation and open space), or absolute environmental restrictions (vacant land characterized by wetland vegetation).

- To determine how much of the effective inventory of vacant land is allocated for future development in four main land use categories: residential (PC Code = 00), commercial (PC Code = 10), industrial (PC Code = 40), and institutional (PC Code = 70).

- To identify criteria to rank the intrinsic development suitability of vacant land. The ranking system is based on the assumption that the presence, nature, and extent of certain constraints may make parcels less suitable for development. For example, parcels characterized by hammock vegetation, while usually developable to some extent, tend to rank lower in the development suitability scale because local regulations impose additional constraints to development in those types of parcels. However, the user may override this constraint and specify any degree of development.

- To determine the suitability of available vacant land within each of the above future land use categories. Specific criteria were applied to be consistent with current policy and the existing regulatory framework and for which adequate data is available. For example, criteria for residential land included location in a legally platted subdivision, availability of infrastructure, absence of natural habitat vegetation cover (i.e., hammock), and high flood base elevation (Table 4.1). The ADID layer was used in conjunction with the parcels to provide a land use and land cover base map for the study. Floodplain designation was obtained from the Federal Emergency Management Association (FEMA) Flood Insurance Rate Maps (FIRM). In the case of nonresidential land, this list was modified to incorporate proximity to U.S. 1 as a determinant (Table 4.2). It was assumed that most types of nonresidential development would be attracted first to vacant land that is visually and functionally accessible to U.S. 1. To avoid applying arbitrary distances, physical adjacency of the parcel to the highway was used to define proximity.

- To estimate the development capacity of vacant land selected for conversion in the scenario. Unless otherwise directed by the user for a specific scenario run, the model does this by applying appropriate density and intensity coefficients adopted from local zoning regulations.

The zoning data provided in the Tax Roll were used to define an appropriate set of density and/or intensity coefficients. For example, vacant parcels zoned as Improved Subdivision, or an equivalent classification, were assumed to yield one dwelling unit per lot. Applicable density and intensity coefficients were multiplied by the total acreage of land in each vacant land subcategory to calculate the potential gross number of dwelling units and/or amount of nonresidential floor area that a scenario will generate.

Determine the Actual Intensity of Existing Development

The intensity of existing development was determined to support scenarios involving conversion of developed land from one use to another or for a change in the intensity of development. The number of existing residential dwelling units, or the amount of existing nonresidential floor area, was divided by the total acreage in each developed land subcategory.

TABLE 4.1
SPECIFIC CRITERIA OF SUITABILITY RANKING FOR RESIDENTIAL LAND

Ranking	Factor								
	Platted Subdivision Infill		Infrastructure (Availability of Water Service)		Floodplain Designation			Vegetation Cover (Hammock)	
	Yes	No	Yes	No	X	AE	VE	Yes	No
Most Suitable	■		■		■				■
	■		■			■			■
Moderately Suitable	■		■				■		■
		■	■		■				■
		■	■			■			■
		■	■				■		■
	■		■		■			■	
	■		■			■		■	
Marginally Suitable	■		■				■	■	
	■			■	■			■	
	■			■		■		■	
	■			■	■				■
	■			■		■			■
	■			■			■		■
	■			■			■	■	
		■	■			■		■	
		■	■				■	■	
Least Suitable		■		■			■		■
	■			■	■			■	
	■			■		■		■	
	■			■			■	■	
		■		■	■			■	
		■		■		■		■	
		■		■			■	■	

Notes:

Floodplain Designation:
X = Outside of 100-year and 50-year flood plain.
AE = Area inundated by 100 year flooding.
VE = Area inundated by 100 year flooding with velocity hazard.

TABLE 4.2
SPECIFIC CRITERIA OF SUITABILITY RANKING FOR NONRESIDENTIAL LAND

Ranking	Factor						
	Proximity to U.S. 1		Floodplain Designation			Vegetation Cover (Hammock)	
	Yes	No	X	AE	VE	Yes	No
Most Suitable	■		■				■
Moderately Suitable	■			■			■
	■				■		■
		■	■				■
		■		■			■
		■			■		■
Marginally Suitable	■		■			■	
		■	■			■	
Least Suitable	■			■		■	
	■				■	■	
		■		■		■	
		■			■	■	

Notes:

Floodplain Designation:
X = Outside of 100-year and 50-year flood plain.
AE = Area inundated by 100 year flooding.
VE = Area inundated by 100 year flooding with velocity hazard.

Select Developed Land Suitable for Redevelopment Activities

Criteria for selection of developed land suitable for redevelopment activities were identified in collaboration with local planners and were based on the assumption that the presence, nature, and extent of certain combinations of conditions may affect the likelihood of redevelopment. These conditions, for which data are available in the Tax Roll, are combined to identify potential redevelopment areas for use in the CCIAM:

1. Residential/commercial structures older than 20 years.
2. Residential/commercial structures less than 33 percent of the land value.
3. Residential structures smaller than 1,200 square feet.
4. Commercial structures with a floor area ratio of less than 19 percent.
5. Waterfront properties.

Once a scenario has been fully defined by the user, the model produces a new GIS layer that represents the new land use pattern. These outputs include:

- Maps illustrating the future land use pattern resulting from the scenario definition.
- Attributes for each land use category including acreage, gross density (in dwelling units/acre) and intensity (in Floor Area Ratio) of development, and number of dwelling units and/or amount of nonresidential floor area generated by the scenario.

The suitability analysis does not identify "vested" development, which exist in areas of the Florida Keys. As the state and local governments explore different development scenarios, vested developments may constitute a scenario. At this time, no detailed listing of vested developments is available at Monroe County.

4.3 Assumptions and Uncertainties

The selected ranking criteria represent a subset of all potential suitability criteria. Several commonly used factors, including soil type, topography, and quality of adjacent development, were not used because they have lower applicability and impact on the development potential of land in the Florida Keys.

Availability of infrastructure is typically an important development suitability criterion. The FKAA provided the only useable data regarding availability of water service. In the future, additional infrastructure data can be incorporated into the model by modifying the selection criteria.